NEW SPECIES OF MARINE FOSSIL MOLLUSCA FROM WESTERN NORTH AMERICA

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LEO G. HERTLEIN

New species of fossil mollusca in the Paleontological collections of the Leland Stanford Junior University, from the Jurassic and Tertiary of western North America, are described in this paper. The writer wishes to acknowledge the kind help received from Dr. J. P. Smith in the preparation of this paper; he also wishes to thank Mr. E. K. Jordan and Mr. C. H. Crickmay for help in the preparation of the manuscript. Acknowledgement is also due Mr. B. L. Cunningham, H. Hannibal, H. J. Hawley and A. W. Ambrose, for the collection of the material described in this paper. The types and paratypes are in the type Paleontological collection of the Leland Stanford Junior University.

The new species described are:

Jurassic

Uptonia silviesi Hertlein, new species. Charmouthian, Middle Lower Jurassic.

Miocene

Pecten (Pecten) hawleyi Hertlein, new species. Vaqueros, Lower Miocene.

Pecten (Amusium) condoni Hertlein, new species. Montesano, Miocene.

Buccinum jordani Hertlein, new species. Montesano, Miocene.

Chrysodomus hannibali Hertlein, new species. Montesano, Miocene.

Pecten (Chalamys) hodgei Hertlein, new species. Santa Margarita, Upper Miocene.

Pliocene

Pecten (Pseudamusium) vancouverensis fernandoensis Hertlein, new subspecies. Fernando, Lower Pliocene.

Uptonia silviesi Hertlein, new species

Plate 3, figures 1, 2, 5.

Shell of medium size, laterally compressed; whorls 5, slightly convex on the ventral side and widely umbilicate; whorls higher than wide; sides of whorl form a squarish shoulder at the ventral edge, a slight groove present in the dorsal part of the whorl due to the impression from the earlier whorl. Whorls ornamented by numerous, closely spaced ribs which slope from the dorsal edge toward the ventral edge and at the ventral margin of the whorl each rib surmounted by a sharp node; venter almost smooth, though showing very slight ribs. Septation unknown. Diameter of largest whorl approximately 150 mm.; height of largest whorl approximately 35 mm.; thickness of largest whorl approximately 26 mm.

Type: No. 99 (L. S. J. U. Type collection), from Loc. 27 (L. S. J. U.), in dark red sandstone, section 7, T. 20 S, R. 30 E., Tim Donovan's ranch near Silvies River, 18 miles north of Burns in Harney County, Oregon; B. L. Cunningham collector. Age, Charmouthian. Middle Lower Jurassic.

Associated fauna occurring with *Uptonia silviesi* Hertlein is: *Anatina* sp., *Gervillia* sp., *Pecten acutiplicatus* Meek, *Pleuromya concentrica* Meek, *Pleuromya depressa* Meek, *Pholadomya multilineata* Gabb, *Pholadomya* cf. *nevadana* Gabb, *Pholadomya* sp.

This is apparently the same fauna as found in the Hardgrave sandstone of northern California. The presence of the genus *Uptonia* in eastern Oregon appears to place the stratigraphic position of the Hardgrave sandstone as middle Lias: In England the Genus *Uptonia* is restricted to the Charmouthian Series by Buckman.

Pecten (Pecten) hawleyi Hertlein, new species

Plate 4, figures 4, 5.

Shell small, moderately thick, inequivalve. Right valve moderately convex, the point of greatest convexity being about one-third the distance from the apex to the ventral margin of the disk, the umbos gently rounded to the plane of the ears; surface ornamented by 17 to 18 prominent, sharply rounded ribs with nearly flat interspaces, toward the posterior extremity the ribs become flattened, and broader, and the interspaces broader proportionately; toward the periphery of the disk the ribs become somewhat less elevated and the sides of the ribs are more sloping to the flattened interspaces, in addition the surface of the right valve is ornamented by closely spaced, very fine, concentric lines, which are most prominent near the periphery of the disk; ears ornamented by concentric lines of growth, the anterior with a small byssal notch. Left valve slightly convex, slightly depressed near the anterior and posterior dorsal margins, ornamented by 16 to 17 very narrow, round ribs which expand but slightly towards the periphery of the disk, and are separated by interspaces wider than the ribs, the surface also sculptured by numerous fine, concentric growth lines which are more prominent than those on the right valve; ears crossed by very fine lines of growth. Height 32 mm.; length 34 mm.; apical angle of left valve approximately 125°.

Type: Left valve No. 19 (L. S. J. U. Type collection) from L. S. J. U. Geol. Surv. Loc. 860, upper beds of the Vaqueros sandstones, Santa Inez Mountains, Santa Barbara County, California; H. J. Hawley collector, Vaqueros Miocene; *Paratype*: right valve No. 22 (L. S. J. U. Type collection), same locality.

Pecten hawleyi Hertlein resembles *P. sanctaecruzensis* Arnold, but the present species is smaller, has a greater number of ribs, and has more prominent concentric sculpture on both valves than *P. sanctaecruzensis*.

At the type locality *P. hawleyi* Hertlein is associated with: *Pecten vanvlecki* Arnold, *Rapana vaquerosensis* Arnold, *Turritella inezana* Conrad.

This species is named in honor of Mr. H. J. Hawley who collected the type specimen.

Pecten (Patinopecten) kernensis Hertlein, new species

Plate 4, figure 3.

Shell large, slightly arched, moderately thick. Right valve ornamented by about 22 to 24 fairly high, flattish topped, round edged, radiating ribs of unequal size, separated by slightly rounded interspaces which are narrower than the ribs, many of the interspaces sculptured by a tiny midrib, whole surface ornamented by fine concentric lines of growth; anterior ear large, bearing a large byssal notch, ear ornamented by about 4 or 5 radiating riblets crossed by concentric lines of growth; posterior ear ornamented by about 6 radiating riblets crossed by concentric lines of growth. Height approximately 93 mm.; length approximatley 93 mm.; length of hinge line 57 mm.; apical angle approximately 100°.

Type: Right valve, No. 128 (L. S. J. U. Type collection), from Loc. 150 (L. S. J. U.) Pyramid Hill, 3 miles northwest of mouth of Kern River Canyon, Kern County, California; W. D. Kleinpell collector. Monterey, Miocene.

Pecten kernensis differs from *P. propatulus* Conrad, and *P. oregonensis* Howe, in the more numerous, unequal ribs, and less numerous, coarser ribs on the posterior ear of the present species. From *P. caurinus* Gould, *P. kernensis* is distinguished by the narrower ribs and strongly sculptured ears.

A species very similar to or identical with *P. kernensis* has been reported from the Miocene of Lincoln County, Oregon, by H. V. Howe.

Pecten (Amusium) condoni Hertlein, new species

Plate 4, figures 8, 9.

Shell of medium size, subcircular, equivalve, equilateral, somewhat compressed, of moderate thickness. Right valve ornamented by about 16 smooth, faint, radiating ribs which broaden rapidly as the shell becomes larger, at the ventral margin being about two or three times as wide as the very slight interspaces; whole surface of shell ornamented by concentric lines of growth, these in some specimens quite pronounced and in others almost wholly lacking; ears small, obliquely truncated, a very slight byssal notch present on the anterior ear, ears sculptured by numerous fine concentric lines of growth. Left valve slightly more globose at the umbo, sculptured much as right. Interior of valves ribbed. Height 73 mm.; length 73 mm.; hinge line approximately 25 mm. in length; apical angle approximately 105°.

This species is known to attain a size of 85 mm. in height and 90 mm. in length.

Type: No. 15 (L. S. J. U. Type collection); *Paratype*: No. 18 (L. S. J. U. Type collection), from Loc. 148 (L. S. J. U.=N. P. 44), at dam No. 35, West Wishkah River, Washington; H. Hannibal collector, Montesano, Miocene.

Pecten condoni is different in appearance from any other *Amusium* described from the West Coast Tertiary. The Amusiums are probably of Oriental derivation and living species of *Amusium* are now found in Oriental waters.

Pecten condoni Hertlein is associated with, *Venerella oregonensis* Conrad.

This species is named in memory of Dr. Condon, professor of Geology at the University of Oregon. The writer has adopted the manuscript name of Arnold and Hannibal.

Buccinum jordani Hertlein, new species

Plate 3, figure 3.

Shell large, robust, rather heavy, spire moderately elevated, apical angle approximately 65°; whorls about 6, flattish, in nowise angulate, separated by appressed sutures, sculptured by about 25 narrow, slightly wavy, incised grooves; axial sculpture consisting of lines of growth only; base evenly convex with sculpture similar to that of whorls; a pronounced siphonal fasciole present; canal apparently rather short; inner lip within bearing a thin callous. Height approximately 75 mm.; width of body whorl 44 mm.

Type: No. 130 (L. S. J. U. Type collection), from Loc. 152 (L. S. J. U.) 8 miles up Sylvia Creek, Montesano, Washington; H. Hannibal collector. Montesano, Miocene.

The broadly rounded whorls distinguish this from any other species of Buccinum on the west coast.

Buccinum jordani occurs at the type locality associated with *Chrysodomus hannibali* Hertlein.

This species is named in honor of Mr. E. K. Jordan.

Chrysodomus hannibali Hertlein, new species

Plate 3, figure 4.

Shell moderately large, with about 5 or 6 whorls, separated by slightly channeled sutures; semitabulate spire, apical angle approximately 65°; body whorl with 4 angles each marked by a heavy encircling cord, on the whorls of the spire but two angles and two cords are visible, in addition to the major cords the whorls are also sculptured by numerous, low, flat-topped, spiral ridges, separated by sharply incised lines, columella calloused and smooth. Height approximately 65 mm.; width of body whorl approximately 43 mm.

Type: No. 129 (L. S. J. U. Type collection); from Loc. 152 (L. S. J. U.) 8 miles up Sylvia Creek, Montesano, Washington; H. Hannibal collector. Montesano, Miocene.

The body whorl with 4 angles each marked by a heavy encircling cord distinguish this species from other Chrysodomes.

Chrysodomus hannibali occurs at the type locality with *Buccinum jordani* Hertlein.

This species is named in honor of Mr. Harold Hannibal whose work has added valuable information to the knowledge of west coast stratigraphy.

Pecten (Chlamys) hodgei Hertlein, new species

Plate 4, figures 1, 2.

Shell of medium size, higher than long, slightly compressed, equilateral. Right valve ornamented by over 19 radiating ribs which are largely bifid and often have a small riblet on each side of the large ribs, the ribs toward the margins, become finer, interspaces somewhat rounded, showing very fine pitted surfaces, sculptured by a small intercalary riblet, ribs and riblets bearing fine, scattered, sharp, imbricating spines; sides of valve nearly straight, ventral margin regularly rounded; ears unequal, the anterior much larger than the posterior, anterior ear ornamented by about 5 or 6 coarse, radiating riblets which are crossed by concentric lines of growth, byssal notch large; posterior ear small in proportion to the large anterior ear, ornamented by about 9 small, radiating riblets which are crossed by concentric lines of growth. The ornamentation of the left valve consists of alternating large and small ribs but the ribbing is much finer than on the right valve. Height 47 mm.; length 40 mm.; diameter of right valve approximately 8 mm.; length of hinge line of right valve 25 mm.; apical angle of right valve approximtaely 87°.

Type: Right valve No. 20 (L. S. J. U. Type collection); Paratype: left valve No. 21 (L. S. J. U. Type collection), from Loc. F-6 (L. S. J. U. Geol. Surv.), Coalinga Region, Sec. 20, T. 19 S, R. 15 E, California; F. P. Vickery and P. L. Henderson collectors. Santa Margarita, Miocene.

Pecten hodgei appears to be closely related to *P. halimensis* Makiyama from the Pliocene of Japan, but it differs in that it has less numerous ribs which are more distinctly bifid, than in the species described by Makiyama. From *P. opuntia* Dall, *P. hodgei* differs in having the ribs bifid and arranged in pairs, rather than numerous, closely but irregularly spaced, rounded, and not bifid; the margins of *P. opuntia* are rounded and not straight as in the present species. From *P. jordani* Arnold, *P. hodgei* differs in having more numerous, rounder ribs, which on the right valve become bifid much earlier in the growth of the shell. From *P. hericius* Gould, *P. hodgei* differs in

having less numerous ribs, narrower, less high, and generally finer, and the shell possesses straighter margins in the present species. From *P. egregius* Nomland, *P. hodgei* is distinguished by having more numerous ribs which are differently ornamented in the present species.

Pecten hodgei at the type locality is associated with *Ostrea titan* Conrad, *Pecten crassicardo* Conrad, *Pecten raymondi* Clark.

This species is named in honor of Dr. E. T. Hodge, professor of Geology at the University of Oregon.

Pecten (Pseudamusium) vancouverensis fernandoensis Hertlein, new subspecies

Plate 4, figures 6, 7.

Shell small, somewhat compressed, pearly. Right valve sculptured by numerous submicroscopic radiating ribs which are crossed by concentric lines forming crosshatched sculpture on the shell, at each intersection a tiny node is developed; the anterior ear is well developed and ornamented by about 5 or 6 radiating ribs crossed by concentric lines of growth, posterior ear ornamented by radiating riblets crossed by concentric lines of growth. Left valve with sculpture similar to that of right, the ears of the left valve are well developed and sculptured similar to that of the right valve. There are about 7 to 9 slight, concentric undulations which are more noticeable on the interior casts of the valves than on the exterior of the valves. Height 16 mm.; length 14 mm.; diameter of left valve approximately 3 mm.; length of hinge line of left valve approximately 10 mm.; apical angle of left valve approximately 90°.

This species attains a size of 20 mm. in height and 20 mm. in length.

Type: Left valve No. 16 (L. S. J. U. Type collection), from one-fourth mile south of Taylor well No. 1, and one and one-half miles north of Ventura (on Ventura River) California; A. W. Ambrose collector, Fernando Pliocene; *Paratype*: Right valve, No. 17, (L. S. J. U. Type collection) from Loc. 155 (L. S. J. U.) drill core from depth of 2,800 feet, about 4,500 feet northwest of Signal Hill, 500 feet east of Orange Avenue and 750 feet north of Willow Street, Long Beach, California. Lower Fernando, Lower Pliocene.

Pecten vancouverensis fernandoensis Hertlein is distinguished from *P. vancouverensis* Whiteaves, by more distinct crosshatched sculpture and usually larger size. *P vancouverensis fernandoensis* is distinguished from *P. vancouverensis sanjuanensis* Clark, by finer sculpture and larger size in the present species. *P. vancouverensis fernandoensis* differs from *P. pedroanus* Trask, in its characteristic crosshatched sculpture. *P. vancouverensis fernandoensis* differs from *P. randolphi* var. *tillamookensis* Arnold, in that the present species has small nodes developed at the intersection of the crosshatched sculpture, while the variety described by Arnold has finer striae ornamentation on the valves.

Leland Stanford Junior University.

Plate 3.

Fig. 1. *Uptonia silviesi* Hertlein, new species, approximately four-fifths natural size; type, No. 99 (L. S. J. U. Type Coll.) from Loc. 27 (L. S. J. U.), dark red sandstone, Section 7, T. 20 S., R. 30 E., Tim Donovan's ranch near Silvies River, 18 miles north of Burns in Harney County, Oregon. Charmouthian, Middle Lower Jurassic.

Fig. 2. *Uptonia silviesi* Hertlein, new species, approximately natural size; ventral view of same specimen as Fig. 1.

Fig. 3. *Buccinum jordani* Hertlein, new species, approximately natural size; type No. 130 (L. S. J. U. Type Coll.) from Loc. 152 (L. S. J. U.) 8 miles up Sylvia Creek, Montesano, Washington; Montesano, Miocene.

Fig. 4. *Chrysodomus hannibali* Hertlein, new species, approximately natural size; type No. 129 (L. S. J. U. Type Coll.) from Loc. 152 (L. S. J. U.), 8 miles up Sylvia Creek, Montesano, Washington; Montesano, Miocene.

Fig. 5. *Uptonia silviesi* Hertlein, new species, approximately natural size; cross-section of largest whorl of type specimen.

Plate 4.

Fig. 1. *Pecten (Chlamys) hodgei* Hertlein, new species, approximately five-sixths natural size; paratype, left valve, No. 21 (L. S. J. U. Type Coll.) from Loc. F-6 (L. S. J. U. Geol. Surv. Coalinga Region), Sec. 20, T. 19 S., R. 15 E., California; Santa Margarita, Upper Miocene.

Fig. 2. *Pecten (Chlamys) hodgei* Hertlein, new species, approximately five-sixths natural size; type, right valve No. 20 (L. S. J. U. Type Coll.) from same Loc. as Fig. 1.

Fig. 3. *Pecten (Patinopecten) kernensis* Hertlein, new species, approximately natural size; type, right valve, No. 128 (L. S. J. U. Type Coll.) from Loc. 150 (L. S. J. U.), Pyramid Hill, 3 miles northwest of Mouth of Kern River Canyon, Kern County, California; Monterey, Miocene.

Fig. 4. *Pecten (Pecten) hawleyi* Hertlein, new species, approximately natural size; paratype, right valve, No. 22 (L. S. J. U. Type Coll.) from Loc. (L. S. J. U. Geol. Surv. Loc. 860) upper beds of the Vaqueros sandstones, Santa Inez mountains, Santa Barbara County, California; Vaqueros, Lower Miocene.

Fig. 5. *Pecten (Pecten) hawleyi* Hertlein, new species, approximately natural size; type left valve, No. 19 (L. S. J. U. Type Coll.) from same Loc. as Fig. 4.

Fig. 6. *Pecten vancouverensis fernandonesis* Hertlein, new subspecies, approximately five-sixths natural size; paratype, right valve, No. 17 (L. S. J. U. Type Coll.) from drill core from depth of 2,800 feet, about 4,500 feet northwest of Signal Hill, 500 feet east of Orange Avenue and 750 feet north of Willow Street, Long Beach, California; Fernando, Lower Pliocene.

Fig. 7. *Pecten vancouverensis fernandoensis* Hertlein, new subspecies, approximately five-sixths saturál size; type, left valve, No. 16 (L. S. J. U. Type Coll.) from Loc. 155 (L. S. J. U.) one-fourth miles south of Taylor well No. 1, and one and one-half miles north of Ventura (on Ventura River), California; Fernando, Lower Pliocene.

Fig. 8. *Pecten (Amusium) condoni* Hertlein, new species, approximately five-sixths natural size; paratype, left valve, No. 18 (L. S. J. U. Type Coll.) from Loc. 148 (L. S. J. U.=N. P. 44) at dam No. 35 West Wishkah River, Washington, Montesano, Miocene.

Fig. 9. *Pecten (Amusium) condoni* Hertlein, new species, approximately five-sixths natural size; type, No. 15 (L. S. J. U. Type Coll.) Loc. same as Fig. 8. Montesano, Miocene.